Nutrition Education & Child Health Care

a Cognitive Approach Using Multimedia Technology

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Abstract

India has wide social, economical and cultural diversity. It also has an extensive range of nutrition and health related problems especially nutrition related. Therefore, to overcome, it requires professional and appropriate knowledge and related skills so as to influence all possible levels of societies from children to policy makers. Therefore this systemic research was conducted to assess the impact of Nutrition education on dietary practices of school going children & Child care a cognitive approach using multimedia technology. Impact of nutrition education on school going children was evaluated on the basis of alteration of responses obtained from 100 (hundred) selected 5th and 6th grade students. Study protocol was divided into three different phases such as pre test, teaching programme (nutrition education) and post test. Student’s nutrition awareness was evaluated by using a specially designed questionnaire, which was prepared by experts working in the area of Nutrition. After completion of fifteen days training programme post test was conducted to assess the improvement of
knowledge about nutrition and health awareness amongst those selected children. Results obtained in the post test significantly provide evidence that proper training of nutrition, healthy diet might improve cognitive behaviour towards healthy eating habits as well as help to change their mid set especially towards food preference.

Thus present study revealed that proper nutrition education will certainly improve student’s focus towards their dietary habits but also improve their participation and performance in day to day activities.

**Keywords:** Nutrition Education; Nutrition Knowledge; Primary School; cognitive behaviour

**Introduction**

Nutrition education means to impart nutrition related knowledge to the community with the aim of improving the knowledge and changing the behaviour so as to result in an improved nutritional status. Incorporation of nutrition topics in the primary school curricula should support the acquisition of nutrition knowledge in different ways and indirectly the development of healthy eating habits in children and teenagers [1]. However, promotion of healthy food habits in children requires well trained Community health workers (CHWs), practicing dieticians and nutritionists who have not only knowledge about nutrition but also expertise in promoting importance of good health, development of nutrition education and curriculum. Incorrect food habit impairs physical growth, cognitive development, and immunity in young children; in school-aged children it may affect school performance. Overall, global estimates show 46% of school age going children are anaemic [2]. The shift in eating habits towards junk food has created an imbalance of macro and micronutrients in diet leading to a rise of micronutrient deficiencies and decrease in scholastic performance. The foremost objective of promoting proper healthy nutrition in children is to extend healthy eating habits. This may perhaps possible by improving healthy life styles of the people, one of the activities for promoting healthy nutrition is also reshaping educational contents in school curricular [3].

Nutrition education, may take various forms of formal and informal education, which can also significantly change nutrition behaviour and dietary habits of children [4]. Several researchers have shown that well planned nutrition education can significantly influence the quality of nutrition knowledge of children [5]. Nutrition behaviour gets directly influenced by the attitudes, and several other psychosocial factors. On the other hand, only education as well as nutrition knowledge, does not always have direct impact on nutrition behaviour of individuals [6]. Nutrition education is an accessible effective tool in the promotion of health nutrition in education programmes with focus on healthy eating [7].
Other than conventional teaching use of audio visual aids have been found to be more effective teaching method for children and young ones [8].

During various stages of life cycle, proper food and good nutrition are essential for survival, physical growth, mental development, performance, productivity, health and well-being. Many researchers have proven that adolescents are a very important audience for nutrition education because a healthy diet is essential for their optimum growth and development. As a teenager they are establishing food patterns that carry into adulthood, balanced diet and nutrition is the key for proper physical growth, development and cognitive maturity. Therefore, the present investigation was carried out to check the impact of nutrition education on school going children using multimedia technology.

**Materials and Methods**

This quasi experimental study was conducted with a convenient sample of 100 children of 5th and 6th grade students, aged 10 – 12 years from a private school of Nagpur, Maharashtra, India. The study’s aims and methodology were presented to the principal and teachers at the beginning of academic session and principal’s approval was taken to conduct the nutrition education study.

The study was designed in a school setting by conducting a pre-test using a questionnaire so as to assess and analyze the knowledge about foods and nutrition among school children. Based on the pre-test results, an interventional presentation was developed using multimedia tools to impart nutrition education to children along with recipe demonstration so as to influence food habits with long lasting impact on their health. The impact on knowledge, attitudes and food habits was measured after the intervention program. Total duration of training programme was fifteen days.

**Data collection**

The school was selected randomly from Nagpur, Maharashtra, India. As for the form of teaching, group work was the most frequent form. Students were organised in small groups, less frequently teaching was done individually, or by frontal explanation. Other teaching methods mentioned were also: practical work like recipe demonstration, problem-based approach.

**Nutrition awareness test**

The study test was designed in a school by conducting a pre-test using a questionnaire of nineteen (19) questions, which was designed by the authors of this article who were working at Post Graduate dept. of Home science and Nutrition, RTM Nagpur University, Nagpur; so as to assess and analyze the knowledge about foods and nutrition among school children. Out of these 19 ques-
tions, students had to choose correct answer from given multiple choices and in item no. 7 to 19, they had to decide whether statement is correct or incorrect. Based on the pre-test results, a multimedia based interventional presentation was developed to impart nutrition education to children along with recipe demonstration so as to influence food habits with long lasting impact on their health. The impact on knowledge attitudes and food habits was measured after fifteen days of intervention program (post test).

Data analysis
Student’s response towards evaluation test was recorded in the form of Yes/No as well as selection of options given to them. Frequency calculation and Chi-square test was performed to check the significance level using MedCalc software Version 10.1.2.0.

Results
Table 1. Results of Nutrition awareness progress in children from Pre and Post test (n=100)

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Questions</th>
<th>Pre test</th>
<th>Post test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct answers</td>
<td>Wrong answers</td>
<td>Correct answers</td>
</tr>
<tr>
<td>1</td>
<td>Meaning of balanced diet</td>
<td>45 %</td>
<td>55 %</td>
</tr>
<tr>
<td>2</td>
<td>Ideal number of meal/Day</td>
<td>0 %</td>
<td>100 %</td>
</tr>
<tr>
<td>3</td>
<td>What is food pyramid</td>
<td>0 %</td>
<td>100 %</td>
</tr>
<tr>
<td>4</td>
<td>What is R.D.A</td>
<td>0 %</td>
<td>100 %</td>
</tr>
<tr>
<td>5</td>
<td>What are deficiency diseases</td>
<td>6 %</td>
<td>94 %</td>
</tr>
<tr>
<td>6</td>
<td>Why should you exercise</td>
<td>54 %</td>
<td>46 %</td>
</tr>
<tr>
<td>7</td>
<td>Without diseases you are healthy</td>
<td>95 %</td>
<td>5 %</td>
</tr>
<tr>
<td>8</td>
<td>Food has nutrients</td>
<td>10 %</td>
<td>90 %</td>
</tr>
<tr>
<td>9</td>
<td>Nothing happens when excess food is consumed</td>
<td>97 %</td>
<td>3 %</td>
</tr>
<tr>
<td>10</td>
<td>Chocolates are healthy</td>
<td>44 %</td>
<td>56 %</td>
</tr>
<tr>
<td>11</td>
<td>Eggs are healthy</td>
<td>41 %</td>
<td>59 %</td>
</tr>
<tr>
<td>12</td>
<td>Bread is nutritious than rotis</td>
<td>83 %</td>
<td>17 %</td>
</tr>
<tr>
<td>13</td>
<td>Carbohydrates give energy</td>
<td>26 %</td>
<td>74 %</td>
</tr>
<tr>
<td>14</td>
<td>Proteins are required for growth</td>
<td>10 %</td>
<td>90 %</td>
</tr>
<tr>
<td>15</td>
<td>Vitamins and minerals protect from infections</td>
<td>22 %</td>
<td>78 %</td>
</tr>
<tr>
<td>16</td>
<td>Fibrous foods and roughage should not be consumed</td>
<td>71 %</td>
<td>29 %</td>
</tr>
<tr>
<td>17</td>
<td>Anaemia is caused by iron deficiency</td>
<td>22 %</td>
<td>78 %</td>
</tr>
<tr>
<td>18</td>
<td>Thin is weak and fat is healthy</td>
<td>61 %</td>
<td>39 %</td>
</tr>
<tr>
<td>19</td>
<td>Road side foods contain microorganisms</td>
<td>47 %</td>
<td>53 %</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>38.79</td>
<td>61.21</td>
</tr>
<tr>
<td></td>
<td>SDV ±</td>
<td>31.76</td>
<td>31.76</td>
</tr>
</tbody>
</table>
Table 2. Analysis of percent responses based on Food preference (n=100)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Foods</th>
<th>Pre test</th>
<th>Post test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Homemade Food</td>
<td>40%</td>
<td>97%</td>
</tr>
<tr>
<td>2</td>
<td>Junk Foods</td>
<td>60%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Chi-square  DF  Significance level  Contingency coefficient
72.668  1  P < 0.0001  0.516

Graph 1. Pre and post test Comparison of nutrition awareness of students (n=100)

<table>
<thead>
<tr>
<th>Chi-square</th>
<th>DF</th>
<th>Significance level</th>
<th>Contingency coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>101.045</td>
<td>5</td>
<td>P &lt; 0.0001</td>
<td>0.404</td>
</tr>
</tbody>
</table>

Results discussion

To maintain healthy and disease free life, implementation of nutrition education is one of the important factors. For promoting lifelong healthy eating habits it should start at an early stage of life. Nutrition education should be made compulsory subject in schools, Well-planned nutrition education and the adaptation of topic to the stage of cognitive development can significantly influence on the nutrition knowledge of children and the change of their dietary habits.

Therefore an attempt was made to evaluate the impact of nutrition education using different modern available methods in school going children. To evaluate the responses this study protocol was divided in to three phases. Phase-I (Pre test) includes review of basic nutrition awareness in selected subjects, Phase-II (Designing of audio visual education programmes), where comprehensive educa-
tion program was made using multimedia presentation and its conduct and Phase-III (Post test) it consist of evaluation of responses given by children in the pre and post test.

Results of Phase-I (Pre test) was analysed by calculating total number of correct answers given by the students. A list of 19 (nineteen) items (table-1) was designed by the authors working with Food Science and Nutrition division of Home Science. Adequate care was taken to cover all possible angles to interpret basic nutrition awareness. Students had to answer briefly for the question number 1 to 6 and from question no. 7 to 19 they had to select yes or no. Results of pre test were found to be very surprising, the average percentage of correct answers of pre test was found to be only 38.79 ± 31.76. This indicates that 61.21± 31.76 percent students do not have even basic knowledge about nutrition and balanced diet. Astonishingly 90% of these 5th and 6th grade students failed to answer the question “food has nutrients?” The pre test results showed that students’ knowledge and understanding of the facts about energy and nutritive values of the foods is poor. Wrong food habits and nutrition related myths could be reason for development of chronic diseases but early nutritional intervention and awareness of balance diet could prevent future risk of unhealthy life [9].

Children are very much influenced by animated cartoons and characters. Many times they try to imitate those characters in their normal behaviour. Therefore this liking was used as a tool for imparting nutrition education to children thus a small multimedia presentation was made by authors using cartoon characters among students and novelty was added by involving few students of the school and staff for a voice dubbing. Duration of this interactive presentation titled “Diet Power” was kept 18 minutes long followed by a short quiz of few minutes so as to get immediate responses from the children about how much they have understood. This presentation not only gave education about nutrition but also provided demonstration of certain good nutritive recipe preparations. The remedial education was continuing for next fifteen days followed by conducting second knowledge test i.e. the post test.

Graph-1 showed comparison of pre and post test results conducted after fifteen days, where we can directly make out the impact of proper nutrition education on children. From the graph it is observed that a significant improvement of correct answers from 18.00 ± 24.66 to 68.33 ± 9.62 is a mark evident of proper education definitely improves students’ behaviour and approach towards healthy life.

More in depth analysis of graph-1 describes that in a pre test very few or/none student was able to answer few questions like what is food pyramid, what is R.D.A.? Ideal number of meals per day? Etc. It was observed that percentage of correct answers significantly increased from 0 %, 3% and 6% to 65%, 54% and 71% in post test respectively as compared to pre test.

The results also showed that students are well aware of proteins and their importance especially in growth. (Table 1). Compared to the pre test where only
10% students were able to answer correctly, the percentage of correct answer increased in the post test to 88%.

In addition to class room teaching and interactive sessions, students were actively involved in easy to make simple recipes which do not require use of gas or any kind of fuel. It has been observed that when children are involved in some kind of activity especially practical activities, they understand better and develop a liking for that. Their participation was evident when they suggested few modifications in the ingredients for desired taste and names for recipes tasted.

Results of a pre and post test performed for understanding responses based on Food preference were depicted in table-2, the liking towards home made food and junk food was checked and found that appropriate nutrition education and imparting proper awareness could significantly \((p<0.0001)\) improves their preference for healthy foods.

**Discussion**

Various theories are proposed and being followed for health promotion, normal behaviour. To name a few are Theory of Planned Behaviour \([10, 11]\), the Health Belief Model \([12]\) or the Health Action Process Approach \([13]\). These theories are based on the assumption that behaviour is cognitive, conscious and calculated to produce rational outcomes. However, most behaviour is not under rational control but is driven by motives that cause people to seek out and secure the things they need to survive and reproduce effectively. These needs include food, mates, social bonds and social justice \([10]\). Appropriate food habit can improve one’s health and behaviour ultimately.

Considering this aspect of human behaviour the present investigation was an attempt to explore impact of formal education on nutrition knowledge of students especially those who are in grade 5th and 6th. A specially designed training module was created using various tools of multimedia and interactive nutritional recipe making sessions followed by a short quiz exercise. The aim at developing such curriculum was to cover topics not only on nutrition but to motivate children to create positive attitudes towards healthy nutrition. By testing their knowledge about food and nutrition at the beginning and at the end of the trial, which lasted for fifteen days, in which we could analyze the level of knowledge and observed their progress in terms of changing inclination towards healthy foods.

Taking into consideration the motivation, which is crucial for learning process, this will influence the formation and changing of attitudes and behaviour of individuals. It is a necessity to introduce such teaching activities and methods into compulsory nutrition education which would motivate and consolidate student self-efficiency \([14]\). Significant improvement in post test results (table-1 and table -3) might be a reason of motivation as students get motivated by authors who worked extensively to convey importance of nutrition.
So far many studies have proven that if nutrition topics are incorporated into other subjects and presented to students by cross curricular approach, learning can become more efficient [15,16].

In view of the results obtained from this present investigation we can conclude that formal nutrition education had positive effects on students’ knowledge on the nutritional value of food. The effect of multimedia is very much evident from advertisements using animation for influencing children.

Food pyramid is the most recognisable teaching model, frequently used in presenting nutrition topics. It is used in the kindergarten, continuing over the first and the second triad of nine-grade elementary school but unfortunately the results of our study showed students of 5th and 6th grades do not understand the basic foundation of food pyramid. This supports the findings of Beltran et.al. (2008) who observed that students of this age are capable of classifying food by its origin but cannot classify it in to groups according to its nutritive value. Therefore use of food pyramid as informative tool should be used efficiently in achieving the teaching goals.

In our study results we have observed that students understand the basic principles of healthy nutrition, they understand how important it is to eat variety of food and normal healthy diet. We had also observed that students are aware that food can influence human health and this has been learned at primary levels of education. They became aware that there is a correlation between unhealthy diets and human diseases. The exposure to multimedia presentation and recipe making activities made them understand the importance of macronutrients and micronutrients such as complex carbohydrates, proteins for growth and development and importance of calcium and vitamins for bone growth and protection from diseases respectively. These findings helped us to correlate the knowledge on the properties of food stuffs with the impacts of food on human health.

**Conclusion**

The present study was focused on the effect of Nutrition education using multimedia technology in which an attempt was made to educate students and also observe their behaviour towards food and food preferences. The analysis of knowledge tests showed that the students acquired adequate knowledge about nutrition; however they are still unable to relate the role of diet with deficiency diseases and school performance. The multimedia presentation showed the relation between deficiency diseases and diet Therefore, teaching should aim at leading children towards analytical and logical thinking for solving problems. Only good and consolidated nutrition knowledge can further lead to forming positive attitudes towards healthy eating which would later, in the years of adolescence and adult life, influence the formation of positive dietary habits and
make children less susceptible to negative eating habits or the negative influence of their peers and mass media.

To improve the quality of nutrition education we propose that schools must introduce supplementary curriculum in education in nutrition science and provide didactic training for the teachers teaching nutrition topics as part of compulsory subjects.

References


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